

THE CLAIMS

What is claimed is:

1. A slider flying-height controller for a hard disk drive, the controller comprising:
a heater current controller receiving an input signal and outputting a control current in response to the input signal; and
a multiplexer coupling the control current to a heating element associated with a write element on a selected slider body of the hard disk drive when the hard disk drive is in a read operation, the heating element dissipating a power that is proportional to the input signal and causing a spacing decrease between pole tips of the write element and a magnetic medium that is associated with the write element that is proportional to the input signal.
2. The controller according to claim 1, wherein the input signal is an input voltage.
3. The controller according to claim 1, wherein the input signal is an input current.
4. The controller according to claim 3, wherein the heater current controller includes a square-root circuit receiving the input current and outputting a first current that is proportional to the square root of the input current, and
wherein the control current is proportional to the first current.
5. The controller according to claim 4, wherein the first current is proportional to the square root of the product of the input current and a second current having a predetermined magnitude.
6. The controller according to claim 4, wherein the heater current controller further includes a current-pass element coupled to the first current and outputting the control current.

7. The controller according to claim 6, further comprising a low-pass filter coupled to the output of the heater current controller that reduces high frequency disturbances in the output of the heater current controller.

8. The controller according to claim 6, wherein the heater current controller further includes a current-to-voltage converter that receives the first current and produces a voltage that is coupled to the current-pass element, and

wherein the control current output from the current-pass element generates a voltage across the heater element that is proportional to the first current.

9. The controller according to claim 8, wherein current-to-voltage converter includes:
a resistor through which the first current passes and generates a first voltage; and
an operational transconductance amplifier that receives the first voltage and outputs a third current that drives the current-pass element.

10. The controller according to claim 9, wherein the current-to-voltage converter includes a low-pass filter coupled to the output of the operational transconductance amplifier that reduces high frequency disturbances in the output of the operational transconductance amplifier.

11. The controller according to claim 3, wherein the input signal is generated by a digital-to-analog converter based on selected data input to the digital-to-analog converter.

12. The controller according to claim 1, further comprising a common voltage level generator having an output that is connected to complete a current path for the control current through the heating element.

13. The controller according to claim 12, wherein the common voltage level is a potential

that is different from ground.

14. The controller according to claim 12, wherein the common voltage level is selected to maximize a voltage headroom for the heating element.

15. The controller according to claim 1, wherein the controller is part of a read/write electronics module for the hard disk drive.

16. A hard disk drive, comprising:
a plurality of slider bodies, each slider body including at least one read element and at least one write element; and
a read/write electronics module including:
a heater current controller receiving an input signal and outputting a control current in response to the input signal; and
a multiplexer coupling the control current to a heating element associated with a write element on a selected slider body when the hard disk drive is in a read operation, the heating element dissipating a power that is proportional to the input signal and causing a spacing decrease between pole tips of the write element and a magnetic medium that is associated with the write element that is proportional to the input signal.

17. The hard disk drive according to claim 16, wherein the input signal is an input voltage.

18. The hard disk drive according to claim 16, wherein the input signal is an input current.

19. The hard disk drive according to claim 18, wherein the heater current controller

includes a square-root circuit receiving the input current and outputting a first current that is proportional to the square root of the input current, and

wherein the control current is proportional to the first current.

20. The hard disk drive according to claim 19, wherein the first current is proportional to the square root of the product of the input current and a second current having a predetermined magnitude.

21. The hard disk drive according to claim 19, wherein the heater current controller further includes a current-pass element coupled to the first current and outputting the control current.

22. The hard disk drive according to claim 21, further comprising a low-pass filter coupled to the output of the heater current controller that reduces high frequency disturbances in the output of the heater current controller.

23. The hard disk drive according to claim 21, wherein the heater current controller further includes a current-to-voltage converter that receives the first current and produces a voltage that is coupled to the current-pass element, and

wherein the control current output from the current-pass element generates a voltage across the heater element that is proportional to the first current.

24. The hard disk drive according to claim 23, wherein current-to-voltage converter includes:

a resistor through with the first current passes and generates a first voltage; and

an operational transconductance amplifier that receives the first voltage and outputs a third current that drives the current-pass element.

25. The hard disk drive according to claim 24, wherein the current-to-voltage converter includes a low-pass filter coupled to the output of the operational transconductance amplifier that reduces high frequency disturbances in the output of the operational transconductance amplifier.

26. The hard disk drive according to claim 19, wherein the input signal is generated by a digital-to-analog converter based on selected data input to the digital-to-analog converter.

27. The hard disk drive according to claim 16, wherein the read/write electronics module further includes a common voltage level generator having an output that is connected to complete a current path for the control current through the heating element.

28. The hard disk drive according to claim 27, wherein the common voltage level is a potential that is different from ground.

29. The hard disk drive according to claim 27, wherein the common voltage level is selected to maximize a voltage headroom for the heating element.